FY 2013 Region 1 Refuge I&M Proposal Template

Submitted by: J. Michael Hudson

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Project title:
Post-restoration Aquatic Species Assessment on the Bandon Marsh Ni-les'tun Unit of Bandon Marsh National Wildlife Refuge

Primary individual responsible for completing the project (name, title, contact information):
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Project abstract:

The loss of tidal wetlands, primarily through dike construction and draining, has been identified as a major factor contributing to the decline of fish populations and overall productivity of estuaries. Bandon Marsh National Wildlife Refuge (NWR) is conducting a large-scale tidal marsh restoration project on the Ni-les'tun Unit, within the Coquille River estuary. This project is designed to restore approximately 418 acres of important tidal wetlands. Construction was completed in fall 2011, establishing it as the largest tidal marsh restoration project in Oregon's history.

The proposed project is a monitoring component focused on changes in the aquatic species community before and after the restoration construction that occurred in 2010 and 2011. For the purposes of this proposal, construction is referred to as a specific action implemented to achieve restoration of the tidal marsh, which has an unknown timeframe. Objectives of the monitoring component are as follows: 1. Describe and compare fish species community within and among restoration areas and reference areas before and after construction; 2. Describe and compare fish species distribution within and among restoration areas and reference areas before and after construction; 3. Describe and compare fish species relative abundance within and among restoration areas and reference areas before and after construction; 4. Collect invertebrates to archive from restoration areas and reference areas before and after construction.

Funding Priorities (check all funding priorities that apply to the project):

X	Inventory Project/Collection of Baseline Data	X	Adaptive Management
X	Data Compilation and Management	X	Protocol Development
☐	Purchase of Equipment	X	Evaluate effects of environmental stressors, incl. climate change
X	Leveraging existing programs supporting surveys on refuges.		

This work is relevant to several funding priority objectives identified in the RFP:

- Inventory Project/Collection of Baseline Data – The proposed work provides baseline community structure and distribution information on aquatic species, including a listed salmon and several other Federal trust fish species, immediately following the restoration action at Bandon Marsh NWR. This year and next year are critical for establishing that baseline for a long term monitoring approach that is designed to detect changes in aquatic species community structure and distribution. Along with the data collected prior to the restoration action, and during the interim phase, this baseline information and future data collected will inform managers of the biological response of aquatic species to the restoration action.
- Adaptive Management – The work being conducted through this and other similar monitoring efforts is quantitatively informing managers of the success (or failure) of tidal marsh restoration actions. That information can be used to appropriately plan for similar future actions.
- Data Compilation and Management – The data being collected through implementation of the proposed work is being collected and maintained in a systematic approach that has been utilized in previous monitoring phases of this restoration action as well as in monitoring associated with a similar action at Nestucca Bay NWR. The standardized sampling design, data compilation, data management and data analysis approaches lend themselves to spatial and/or temporal comparisons.
- Protocol Development – Implementation of the proposed work allows for the continued testing and demonstration of the effectiveness of the standardized approaches developed and being utilized.
- Evaluate the Effects of Climate Change or Other Stressors – Baseline data collected through implementation of the proposed work will lend itself for comparison in a long term monitoring database to evaluate potential effects of climate change.
- Leverage Existing Programs Supporting Surveys on Refuges – The Columbia River Fisheries Program Office (CRFPO) has conducted considerable work toward better understanding the aquatic resources on several NWRs in Region 1 including Bandon Marsh NWR, Nestucca Bay NWR, Lewis and Clark NWR, Julia Butler Hansen NWR, Ridgefield NWR, Franz Lake NWR, Pierce NWR, Hanford Reach National Monument, Malheur NWR, and Hart Mountain NWR. This continued partnership between Fisheries and National Wildlife Refuges will ensure that CRFPO can continue to contribute its considerable expertise of aquatic species to support natural resource and information priorities shared among Service programs at both regional and national scales.

Project objective(s):

1. Describe and compare fish species community within and among restoration areas and reference areas before and after construction
2. Describe and compare fish species distribution within and among restoration areas and reference areas before and after construction
3. Describe and compare fish species relative abundance within and among restoration areas and reference areas before and after construction
4. Collect invertebrates to archive from restoration areas and reference areas before and after construction.

Describe how project deliverable(s) will be used by the refuge staff for decision making:

Implementation of the proposed work will result in a comprehensive report documenting and comparing short term assessment and monitoring data collected before and after construction (2007-2013) at Bandon Marsh NWR. This comprehensive report can be used by NWR managers to better understand potential aquatic species benefits from similar restoration actions, therefore, informing their decision making process. This report will also serve as baseline information against which long term monitoring data can be compared.

Methods:

The methods will follow those established during the pre-restoration assessment (Hudson et al. 2011), and modified to the new physical features of the marsh during the interim assessment (Silver et al. 2012), as outlined below.

Fish Sampling

Stream sections in Fahys and Redd creeks were originally differentiated by habitat characteristics, resulting in 6 sections for Fahys Creek and 1 section for Redd Creek. For Sections 1-4 in Fahys Creek and Section 1 in Redd Creek, we have maintained a systematic approach using two hoop nets, placed cod end to cod end with wings, providing the ability to block all, or at least the majority of, a channel during a sampling period. After testing a variety of approaches and designs while working at the Nestucca Bay NWR (USFWS *unpublished data*, Little Nestucca River Restoration, NFWF Project #2006-0175-003), this technique was determined to be the most successful approach for collecting a representative fish sample. Random sample sites (Fahys n=9; Redd n=3), each representing 50 m reaches, were identified across the five sections of the two streams. Fishing occurs overnight for over 21 hours, on average, resulting in sampling nearly two tidal cycles. By blocking channels in both directions fish can be captured on both incoming and outgoing tides or by upstream and downstream movements.

Electrofishing is conducted in sections 5 – 6 of Fahys Creek using Smith Root LR-24 electrofisher. Sampling is conducted working upstream with two netters. Electrofishing is completed twice a year, once in the fall and once in the spring.

Following the restoration action, an expanded network of tidal marsh channels existed. The original sample design described above for Fahys and Redd creeks was expanded to include seining random, spatially balanced 50 m reaches. Approximately 20 of these reaches will be sampled annually in a rotating panel design. An unbagged, 15.20 m long, 1.8 m deep, 0.6 cm mesh seine with float and lead lines is used to sample.

Two reference sites are sampled in the Bandon Marsh Unit that is historically a separate non-diked tidal marsh with functioning natural channels on the west side of the refuge. One random sample site, each representing a 50 m reach, was identified per channel (section). Reference-1 (REF-1) is located west of Hwy 101 and south of the river and Reference-2 (REF-2) is located southwest of REF-1. Both hoop nets and seines are used to sample as described above.

To gather information on fish community in the river, four beach seine sites were sampled on the mainstem Coquille River adjacent to Bandon Marsh NWR. Four sample sites, each representing a 50 m reach, were chosen in the section of the Coquille River spanning 50 m upstream of Redd Creek to 50 m downstream of Fahys Creek. These sites were chosen based on spatial dispersion through the section and accessibility. All sites are on the north bank of the Coquille River. Seine 1 (SEINE-1) is located just downstream of the mouth of Fahys Creek. Seine 2 (SEINE-2) is located directly south of the bunkhouse. Seine 3 (SEINE-3) is located approximately 100 m downstream from the mouth of Redd Creek. Seine 4 (SEINE-4) is located just upstream of the mouth of Redd Creek. Seining was conducted as described for the reference sites.

Fish captured in each net are visually identified and measured for fork length (mm). Weight (g) is collected on all salmonid species. All fish are released at the site of capture immediately following workup.

Macro-invertebrate Sampling

Invertebrate sampling reaches are located on either end and between each of the hoop net sites for Sections 1-4 in Fahys Creek. Sections 5 and 6 are combined to represent one reach. Sampling was also conducted at REF-1. There are a total of 11 reaches between the two areas. Water column and water surface samples are collected using a 250 micron-mesh net with a 30.5 cm^2 opening and a one meter long capture bag that tapered down into a 500 ml collection bottle. Three of these nets were used alongside each other. In the center of each net was a 2030R standard mechanical flow meter. Collected invertebrate specimens were transferred and stored in 500 ml bottles filled with isopropyl alcohol. All

samples were preserved. Efforts were taken so that sampling methods provided both quantitative and qualitative results that could be compared throughout the range of sites as well as with future surveys.

Describe any statistical assistance, GIS, or database support needed:
The CRFPO has statistical and GIS support in house.

Project implementation timeline, including schedules for field/lab/office work, data management (entry, QA/QC, analyses, archiving), and deliverables (e.g., progress/final reports, potential peer-reviewed publications):

- December 2012 – Sampling trip 1 data collection, data entry, and QC
- February 2013 – Sampling trip 2 data collection, data entry, and QC
- April 2013 – Sampling trip 3 data collection, data entry, and QC
- June 2013 – Sampling trip 4 data collection, data entry, and QC
- August 2013 – Sampling trip 5 data collection, data entry, and QC
- September 2013 – Sampling trip 6 data collection, data entry, and QC
- October 2013 – Data analysis
- January 2014 – Final completion report

Project completion date (and mid-completion date, if project extends into FY2014):
January 31, 2014 (mid-completion date – June 7, 2013)

Briefly describe how the project will address each of the following Evaluation Criteria:

1. **Planning Connection -** The Bandon Marsh NWR CCP is presently being finalized. Public review occurred in Fall 2012. The proposed work represents continued implementation of strategies to support multiple objectives under all proposed alternatives in the CCP. Specifically, the proposed work implements salmonid monitoring strategies for Objective 2.1 – Protect and maintain wet-mesic Sitka spruce-western hemlock forest, Objective 2.2 – Restore wet-mesic Sitka spruce-western hemlock forest, Objective 3.1 – Enhance, protect, and maintain salt marsh, Objective 3.2 – Protect and maintain intertidal mudflats, Objective 4.1 – Enhance, protect, and maintain instream aquatic habitat, Objective 5.1 – Conduct inventory and monitoring surveys, and Objective 5.2 – Conduct research. Objective 5.1 and 5.2 are considered high priority, and to this end, the proposed work evaluates resource management to facilitate adaptive management and contributes to the successful achievement of the other resource management objectives identified in the CCP. Furthermore, the results of the proposed work will provide the best scientific information with respect to aquatic resources, reducing uncertainties, and promoting transparent decision making.
2. **Large Investment in Management Actions -** The proposed work represents the monitoring component of the larger Ni-les'tun tidal marsh restoration project at Bandon Marsh NWR. The successful implementation of this restoration project can be attributed to many years of work by multiple partners that contributed approximately $10.6 million in funding.
3. **Partners -** The Ni-les'tun tidal marsh restoration project at Bandon Marsh NWR includes multiple partners both internal to the USFWS (Refuges, Fisheries, Ecological Services) and external (Federal Highway Administration, Coquille Indian Tribe, Confederated Tribes of the Siletz Indians, Oregon Department of Fish and Wildlife, Ducks Unlimited, and the Institute for Applied Ecology).
4. **Controversy -** The proposed work supports decision making for continued on-the-ground activities at Bandon Marsh NWR, including the potential expansion of the Refuge boundary and future acquisitions for tidal marsh restoration. The potential Refuge boundary expansion is controversial and meets continued resistance in the area.

5. **National I&M Priority -** The proposed work supports priority issues identified by the National I&M Initiative by benefitting management actions targeting Federally listed species (i.e., tidal marsh restoration) and benefitting biotic inventories (i.e., standardized monitoring approach).
6. **Project Design -** The proposed project has been designed and implemented to date using technical expertise from the CRFPO in conjunction with continuous communication between Fisheries (Principal Investigator, Field Crew), Refuges (Managers, Biologists) and external partners (e.g., Oregon Department of Fish and Wildlife, Confederated Tribes of the Siletz Indians) to ensure that data collected would continue to support management needs.
7. **Data Management -** Please see next section.
8. **Continuity -** The proposed project represents continuation of ongoing aquatic species monitoring work initiated at Bandon Marsh NWR in 2007. Furthermore, it represents completion of the baseline for a long-term monitoring project to be implemented at regular intervals (e.g., every 5-10 years) to track biological response to the tidal marsh restoration.
9. **Other Evaluation Criteria -** It is the intention of the Native Trout Program and the CRFPO, in support of implementing science excellence throughout the USFWS, to publish the findings of research, monitoring and/or evaluation projects in peer-reviewed publications when and if appropriate. To this end, the principal investigator and others involved in this project have multiple publications in peer-reviewed journals.
   It has also been the practice of the Native Trout Program to hire student workers through the STEP program to assist with field work each summer. This practice will continue in the future through the recently adopted Pathways program.

Briefly describe how the project will address each of the following elements of a Data management plan:.

- **Description** – Seasonal aquatic species monitoring data from Bandon Marsh NWR.
- **Data Management Budget** – 5% of overall project budget, to include data entry, organization, backup and dissemination.
- **Format** – Access database (can convert to more appropriate if necessary)
- **Data Processing and Workflows** – Field work occurs at standardized sample sites for which GPS coordinates were predetermined using ArcGIS. All data collected is cross-referenced with this spatial information.
- **Quality Checks** – Electronic data is entered and verified against original data collection forms independently by separate personnel.
- **Back-up and Storage** – all data are located on CRFPO server, backed up on PI's external hard drive and server backup tapes, and will be provided to the ZIMB.
- **Metadata** – N/A.
- **Restrictions** – There are no restrictions on these data.
- **Contact** – Michael Hudson, Principal Investigator, michael_hudson@fws.gov

Requested funding:

Item	FY13	FY14
Contracts		
Materials/Equipment	$ 1,000	
FWS Personnel Costs	$27,625	
Other (specify):	$ 3,375	
FY TOTAL(S)	$32,000	